

Appl. No. 09/938,399
Amdt. dated March 23, 2004
Reply to Office Action of Nov. 25, 2003

PATENT

REMARKS/ARGUMENTS

This Amendment is responsive to the Office Action mailed on November 25, 2003. A petition for a 1-month extension of time is attached so that the due date is to and including March 25, 2004.

Prior to this Amendment, claims 1-3, 5-16, and 24-25 were pending and subject to examination on the merits. In this Amendment, claims 1, 8, and 12 are amended, no claims are canceled, and claims 26-33 are added so that 1-3, 5-15, and 24-33 are pending and subject to examination.

Support for the new claims and the changes to the claims can be found in the application as originally filed. For example, exemplary support for new claims 26-27 can be found at page 5, lines 1-5. No new matter is added.

Rejection based on Garriga and Miyakawa et al.

Turning now to the rejections of record, claims 1, 3, and 6-10 are rejected as obvious over Garriga and Miyakawa et al. In the Office Action, Miyakawa et al. is only cited for its teaching of a "plasma system" and Garriga is alleged to teach or suggest all other claim limitations.

Neither Garriga nor Miyakawa et al., alone or in combination, teach or suggest an apparatus for forming a first dielectric layer and a second dielectric layer on a substrate, wherein the apparatus comprises, *inter alia*, "a first atmospheric deposition station comprising a first material used to form the first dielectric layer on the semiconductor substrate", and "a second atmospheric deposition station comprising an atmospheric pressure vapor deposition chamber and comprising a second material used to form the second dielectric layer on the semiconductor substrate" as in independent claims 1 and 27. Independent claim 11 recites specific materials (e.g., a sol gel solution) capable of forming even more specific types of layers (e.g., a porous dielectric layer), and Garriga and Miyakawa et al. also fail to teach or suggest these limitations.

The Examiner alleges that the Garriga discloses a first atmospheric deposition station. The "atmospheric" processing areas described by Garriga are "pre-processing" or "post-

Appl. No. 09/938,399
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PATENT

processing" stations that perform processes such as chemical treatment, scrubbing, or spraying (see col. 5, lines 32-57 and col. 6, lines 1-47). None of the atmospheric processing areas are for depositing layers on a semiconductor substrate.

Even the vacuum process stations in Garriga are not used for depositing layers on a semiconductor substrate. Col. 7, lines 12-19 state that vacuum processing stations 520, 522, 524, or 526 are used for plasma ashing, plasma pattern etching, or gas phase HF processing. None of these exemplary process are for depositing layers on a semiconductor substrate, but are for removing layers of material on a semiconductor substrate. Garriga's apparatus is specifically designed to process wafers using sulfur trioxide (col. 2, line 33). As explained in U.S. Patent No. 5,037,506, which is cited in Garriga, sulfur trioxide is used to "strip" material from a wafer, and is not used to deposit materials on a wafer. Accordingly, there is clearly no teaching or suggestion in Garriga of an apparatus like the ones previously or currently claimed.

The Examiner responded to the above arguments by stating the following at page 7 of the Office Action:

Garriga discloses at column 3, rows 62 through column 4, rows 1, that the main feature of the invention is capable of providing "any known semiconductor process". One of ordinary skill in the art would clearly recognize that this includes deposition processes. Further, at column 3, rows 36-42, Garriga states that the apparatus can comprise 'atmospheric-compatible or chemical process steps'. Again, this would indicate to one of ordinary skill in that the apparatus is capable of deposition processes, as clearly deposition is included in this definition. Examiner recognizes that the disclosure fails to explicitly state that the apparatus is capable of deposition processes. However, the processes explicitly mentioned in the disclosure and Applicants Remarks (i.e., etching and rinsing) are clearly used as non-limiting examples and one of ordinary skill in the art would recognize that as structure disclosed in column 5, rows 33-57 the chamber would be capable of deposition. (emphasis original).

In response, Applicants did not argue that Garriga is not "capable of deposition", but argued that Garriga did not teach or suggest deposition processes. Since Garriga fails to teach or suggest deposition processes, Garriga cannot teach materials that are used for deposition

Appl. No. 09/938,399
Amdt. dated March 23, 2004
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PATENT

processes. Such materials are specifically and positively recited in the pending independent claims. Claim 1, for example, recites:

- (a) a first atmospheric deposition station
comprising a first material capable of forming the first dielectric layer on the semiconductor substrate;
- (b) a second atmospheric deposition station
comprising an atmospheric pressure vapor deposition chamber and
comprising a second material capable of forming the second dielectric layer on the semiconductor substrate

Garriga clearly fails to teach or suggest these limitations.

Since Garriga clearly fails to teach or suggest these limitations, the Examiner may believe that the language relating to dielectric layers is somehow "intended use" language and is not of patentable significance (see page, 6, paragraph 31 of the Office Action). However, the underlined limitations are not intended use limitations. Independent claims 1 and 27 positively recite first and second deposition stations "comprising" materials "capable of forming" dielectric layers. Independent claim 11 also positively recites the phrase "wherein the spin coating chamber comprises a first material comprising a sol-gel solution used to form the first porous dielectric layer and wherein the atmospheric chemical vapor deposition chamber comprises a second material used to form the second capping layer". Since the materials that are used to form the first and second layers in the pending apparatus claims are positively recited in the apparatus claims, these limitations are entitled to patentable weight.

The Examiner alleges that Garriga's boilerplate statement that "any known semiconductor process" teaches or suggests the noted limitations. Garriga's boilerplate phrase "any known semiconductor process", which is a genus, does not, *per se*, disclose or suggest the specific particular processes and materials recited in the present independent claims (which are species of the genus). See for example MPEP § 2131.02, which discuss situations where a genus does not suggest a species.

In fact, it is clear that Garriga does not disclose or suggest materials capable of forming the layers recited in the claims. First, as noted by the Examiner, Garriga fails to explicitly state that his apparatus is used for any semiconductor deposition process. Second,

Appl. No. 09/938,399
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PATENT

Garriga discloses at least fifty specific processes at column 5, line 33 to column 6, line 46. However, none of the specific processes are directed to processes that deposit *any* layers on a semiconductor substrate, let alone the layers recited in independent claims 1, 11, and 27. Accordingly, Garriga does not teach or suggest an apparatus including the materials recited in the pending independent claims.

Applicants are also submitting independent claim 27 and dependent claim 26, which recite the phrase "wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus." This feature and the advantages of this feature are described at the top of page 5 of the specification. Clearly, Garriga "teaches away" from this feature. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). As noted at c. 4, l. 54-56 of Garriga, Garriga "requires" a vacuum apparatus and a vacuum process. There is no motivation to modify Garriga to exclude something that is "required" for his invention, and consequently Garriga cannot teach or suggest the limitation "wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus" as in claims 26-27. Accordingly, independent claim 27 and dependents thereon, and dependent claim 26 are clearly patentable over Garriga.

Other Obviousness Rejections

At page 3, claims 2 and 25 are rejected over Garriga, Miyakawa et al., and Neoh. At page 5, claims 11 and 13-15 are rejected over Garriga, Miyakawa et al., and Neoh. Neoh is cited for its teaching of a spin coater. At page 4, claims 5 and 24 are rejected over Garriga, Miyakawa et al., and Imahashi. At page 6, claim 12 is rejected over Garriga, Miyakawa et al., and Imahashi. Imahashi is cited for its teaching of a remote plasma system.

As argued above, the Garriga is a deficient primary reference and the additional citations of the various additional references fail to cure Garriga's deficiencies. In addition, with respect to the rejection based on independent claim 11, the Examiner states that one skilled in the art would have been motivated to have used the teachings in Miyakawa et al. to provide for water

Appl. No. 09/938,399
Amdt. dated March 23, 2004
Reply to Office Action of Nov. 25, 2003

PATENT

repellency, hydrophilic properties, or high hardness. The Examiner also states that Miyakawa et al. mentions semiconductors. This particular rejection is specifically traversed.

Applicants submit that the skilled artisan would not have been motivated to have modified Garriga in the manner proposed by the Examiner. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). In addition to semiconductors, Miyakawa et al. mentions a number of different technologies including ink jet heads. Applicants submit that the passages in Miyakawa et al. that are cited by the Examiner are not intended to be read together, and are believed to be intended for different technologies. Specifically, the descriptions of properties such as water repellency, hydrophilic properties, and high hardness in Miyakawa et al. are not believed to be intended to refer to Miyakawa's disclosure of semiconductors, since they are not generally understood as being desirable properties for semiconductors. For example, it is unclear why one skilled in the art would want to impart "high hardness" to a semiconductor chip, when semiconductor chips are not intended to withstand breakage, but are intended to be computational or data storage devices. Accordingly, Applicants submit one would not have combined Miyakawa et al. with Garriga for the reasons proposed by the Examiner and the obviousness rejections based by Miyakawa et al. are improper.

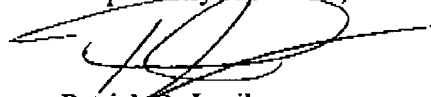
Appl. No. 09/938,399
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PATENT

CONCLUSION

Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance is respectfully requested.

Respectfully submitted,



Patrick R. Jewik
Reg. No. 40,456

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
Tel: 415-576-0200
Fax: 415-576-0300
PRJ:prj
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